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ABSTRACT

Literature concerning human information processing is examined for its implications and extensions into the realm of input processing during second language learning. It is argued that learners can process input solely for meaning, and that once meaning can be accessed automatically, attention can be directed to certain "non-important" structures in the input. However, it is suggested that affective variables may contribute to the eventual processing of these structures, and that second language learners may pidginize if attention is not directed toward items of lesser communicative value. It is also suggested that the processes involved in the reception and decoding of input help to explain the emergence of form in learner speech. Specific recommendations for approaching the empirical investigation of the role of automatic and controlled processes in input processing are made. (MSE)

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# COMMUNICATIVE VALUES AND INFORMATION PROCESSING IN L2 ACQUISITION

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## Introduction

Krashen's Monitor Model (Krashen 1978, 1981) has received much attention in second language acquisition (SLA) research during the last eight years. Of particular importance to the Model is that adult learners may acquire a second language (L2) via meaningful interaction in the L2 where attention is focused on using the language to communicate. Learners somehow "reconstruct" the L2 subconsciously from appropriate input. However, not all input is attended to by the learner. Thus, Krashen has elaborated the concept of "intake." *Intake* is that part of the input which a learner may tune into and process for possible internalization. Just how the learner gets intake from input is a question not adequately addressed by the Model.

Recently, researchers have turned their attention toward information processing theory to investigate the Monitor. Hulstijn and Hulstijn (1984), for example, take a critical look at the proposed properties of the Monitor via the information processing concepts of time and attention. They conclude (among other things) that attention was the most important variable affecting Monitor use and that time, as a factor, was dependent upon amount and direction of attention.

Interestingly, as in the Hulstijn and Hulstijn study, information processing has been used almost exclusively to discuss learner product or output (also see McLaughlin, Rossman and McLeod 1983). Only very recently is SLA research witnessing an application of the concepts of information processing at the input/intake end of L2 development.

This paper is an attempt to examine input processing in SLA utilizing the cognitive psychology concepts of attention and effort. As mentioned previously, crucial to Krashen's hypotheses concerning the Monitor Model is the input/intake distinction: not all of what is heard by the learner is processed as linguistic data.

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It will be argued here that an important aspect of what becomes eligible for intake has to do with processing constraints on available attention and effort. Two different, but not necessarily mutually exclusive, processing strategies will be suggested for typical L2 acquirer: one where attention demands are so great that input can be processed only for informational content, and a second where attention and effort are available to process incoming linguistic input for structure as well as content. First, it will be necessary to take a cursory look at what has been coined in some circles as "selective listening". How these processing strategies affect L2 acquisition will be discussed later.

## Selective Listening

There is ample evidence in SLA literature that learners selectively attend to input. In one study, Schapira reports on Zoila who seems to ignore *how* someone says something, paying more attention to informational content. The following excerpt demonstrates the phenomenon:

Zoila: I never...I never listen, you know the...the words little, uh, small words for continue my conversation.
Rina: What? Like what?
Zoila: The /fras/, you know *frase*?
Rina: Sentence.
Zoila: The sentence, sentence. In the sentence I never using this little, little words.
Rina: Like what?
Zoila: Ah, "and" and "that" [here Zoila gives some examples of 'little words', several of which are incomprehensible to the transcriber]...Well, maybe because I no study...never, and only hear the people and...and talking.
Rina: Yeah, but people talk with these words.
Zoila: Yeah, *pero*...I'm...hear and put more attention the big words. You know and...something "house". I know "house" is the *casa* for me. And /eses/ and little words no too important for me (1978:254).

While several of the phonetic transcriptions of Zoila's comments have been elided in the original quote, Zoila's strategy seems clear: she attends to input by focusing on informational content only. While she states that she pays attention to words, Schapira suggests that Zoila uses this same strategy in attending to structure. Schapira states, "...I suspect what she (Zoila) really means by the distinction 'big words' and 'little words' is not so much the traditional dichotomy content vs. function words, but rather communicative utterances vs. redundancies" (1978:254).

In an interview with an ESL learner, Wenden (1983) revealed the same strategy as reported by Schapira. Following is a fragment of that interview:

Q: Are you comfortable with him (the boss)?
A: Yes, he speaks slowly, more slowly that others, so it's easier for me.
Q: Do you ever notice how he says things?

A: When doing business, I don't consider grammar. Mostly I try to get the meaning. It's not necessary to catch all the words (1983:6).

Clearly this learner is aware of his own focus of attention. Unlike Zoila in the Schapira study, this learner does overtly mention that he ignores structure ("grammar") when attending to someone else's speech.

VanPatten (1983,1984) offers some different evidence for selective listening. Based on a longitudinal study of ten adult learners of Spanish, VanPatten was able to isolate many instances where learners were evidently ignoring how something was said to them. One subject is cited in the following sample interchange:

Q: (pointing to picture) ¿Cómo están ellos? (How are they?)
A: Son contento. (They're happy.) (1984:92)

The learner seemingly did not attend to the correct coupla *estar* in the interviewer's question and produced an utterance in which the wrong copula *ser* was used. The interviewer, intrigued by the phenomenon, rephrased the question while referring to the next picture and moved the copula to a more salient position in the sentence (in this case, sentence final):

Q: Y ellos, ¿cómo están? (And how are they?)
A: Son contento también. (They're happy, too.) (1984:92)

The learner still did not attend to how the interviewer phrased the question. An examination of the other learners (of differing abilities and communicative proficiencies) turned up the same phenomenon of attention. This led VanPatten to conclude that attention was focused on communication only while input was being processed and that form (or structure) was ignored,

Throughout the literature on SLA there are occasional reports on selective listening such as those outlined above. All have in common that selective listening seems to involve concentrated focus on informational content and not necessarily on how that content was delivered. It was suggested in VanPatten (1984) that this particular strategy, i.e., focus on information, be called a "communicative" input processing strategy to parallel the use of the term "communicative" in other areas of SLA literature. What remains to be discussed is just what effect this strategy has on SLA. If learners attend solely to meaning, how do they acquire structure? More importantly, how do learners acquire structure and morphology that may be absolutely meaningless during input processing, e.g., redundant third-person -S?

## Information Processing and Input

The concept of attention focus is not new. Cognitive psychologists have reported on how humans selectively focus their attention when processing incoming stimuli. McLaughlin, Rossman and McLeod (1983) summarize much of the literature on this point, as do Schneider and Shiffrin (1977). McLaughlin et al. come to the conclusion that "not everything reaching the organism through various input channels becomes an object of attention" (1983:136). Later on, McLaughlin et al. state:

> In short, humans are limited-capacity information processors, both in terms of what they can attend to at a given point in time and in terms of what they can handle on the basis of knowledge and expectations. Attention focus – what the individual can attend to at a given point in time – can be focal or peripheral (1983:137).

The terms "focal" and "peripheral" refer to items that the listener perceives as important and less important in terms of processing incoming stimuli. This is exemplified by the processes of skimming and scanning in reading. The eyes go over the print searching for specific information. When the information processing system is alerted to the information's presence (i.e., the eyes "see" it), then attention is focused on that information. Content before and after the specific information may be ignored, indeed not even processed. After skimming, the reader typically recalls that which received attention. To be sure, the information processing system did have to decide whether or not skimmed material was relevant in order to stop and focus, and this was done at tremendously quick speed during the skimming process. However, as the system made its judgement as to relevance, those items deemed irrelevant to the task at hand were quickly released from short term buffer and memory to allow the skimming process to continue at its quick speed. (The reader is referred to the cited authors and to the list of references for more detailed accounts of information processing.)

It does not seem unreasonable to couch the selective listening strategy or communicative processing strategy in terms of information processing. From the cited examples in the previous section, it does seem that L2 learners distinguish between focal and peripheral items in the speech directed at them. However, in terms of the dynamics of a communicative interchange, focal and peripheral are to be interpreted as those elements in an utterance which are important in terms of informational content (focal) and those that are not (peripheral). Language learners may be said to attend to focal items, items of high communicative value, in order to *efficiently* arrive at the informational content of what is directed at them in speech.

Related to the concept of attention, and important to the argument to be developed later, is the notion of "effort". In simplest terms, effort is required by the information processing system in order to attend to and focus in on input. If the task at hand is easy, then little effort is required. As the task assumes complexity/difficulty, then more effort is needed. For most adults, reading for leisure is not a difficult task. Most of us do it with music in the background, while riding a bus, or even with "one eye on the TV." However, reading in order to prepare for an exam puts many more demands on the information processing system as more of the printed page becomes focal matter (as opposed to peripheral). Thus, more effort is needed in order to process the input. Non-related stimuli (cars whizzing by on the street) are either tuned out or are escaped (we seek a quiet, secluded place).

In addition to the notion of effort, there are automatic and controlled processes. Controlled processes are those which require large amounts of effort and are usually considered conscious tasks. Automatic processes require no conscious effort and do not interfere with controlled processes. (See Schneider and Shiffrin 1977). Driving one's car is a controlled process. It demands much effort as the person watches for other cars, keeps an eye on the road, looks for the

various traffic signs, etc. However, shifting gears is an automatic process which requires no effort. It proceeds unconsciously and does not put any attention demands on the information processing system while a person is driving.

Returning to the communicative processing strategy, it becomes immediately evident that depending upon the learner's built-up competence (i.e., acquired L2 system), attending to the informational content of an utterance may be either an automatic process in that it requires no conscious effort and does not interfere with controlled processes (e.g. taking notes on what the other person is saying) or it may be a controlled process, one in which large demands are made upon the information processing system and thus effort is tied up in "getting at the meaning." When the communicative processing strategy is a controlled process, then the learner can attend *only* to the informational content of the utterance. The elements carrying important communicative information become focal, and peripheral items may be lost if there are time constraints on the process. The learner, in effect, strips the sentence of communicatively non-important elements and only decodes for the focal items. It should be noted, as Schapira (1978) suggests, that what is stripped may be entire words or it may be just bound morphology (e.g., verb affixes). The stripped material could be a combination of both. The information processing system may make no distinction between words and inflections if the sole purpose is to process speech input for meaning. This can be illustrated with an example from Spanish. Recall the previous interchange between interviewer and subject from VanPatten (1984). If the learner was concerned only with communication and his built-up L2 system was limited, then it is quite understandable that the copula should be skipped over while processing input. Thus, *¿Como estan ellos?* is stripped of unimportant forms during processing and the learner processes only *cómo* and *ellos*. If that same learner is given a much longer string to process, the effects of attention, effort and controlled processes are much clearer. If the learner is confronted with a sentence such as *¿CUANTas CHICAs hay EN ESTa CLASE*? (How many girls are in this class?) the interaction between attention and effort may allow only for the processing of those elements written in upper case letters (items of high communicative value) while those items in lower case letters (unimportant forms) may be ignored. Thus, what the learner "picks up" may be just *CUANT CHICA EN EST CLASE*?

Controlled processes for understanding an utterance may be prevalent at every stage of the learning of the language if learners are constantly confronted by syntax and vocabulary beyond their competence. In the very early stages, the learner often relies heavily on the L1 to decode sentences by mentally translating utterances from the L2 to the L1. This demands a huge quantity of mental gymnastics and consequently requires much attention and effort from the information processing system. Only communicatively important forms may get processed at this stage. Later, if the L1 can be bypassed as a translator and meaning may be directly accessed from the L2 acquired system, then substantial amounts of attention and effort may be released, and the information processing system may turn its attention to those peripheral items that were once ignored. It is this later stage of development in the L2 learner that will occupy the discussion in the next section of this paper.

## The Learning Strategy

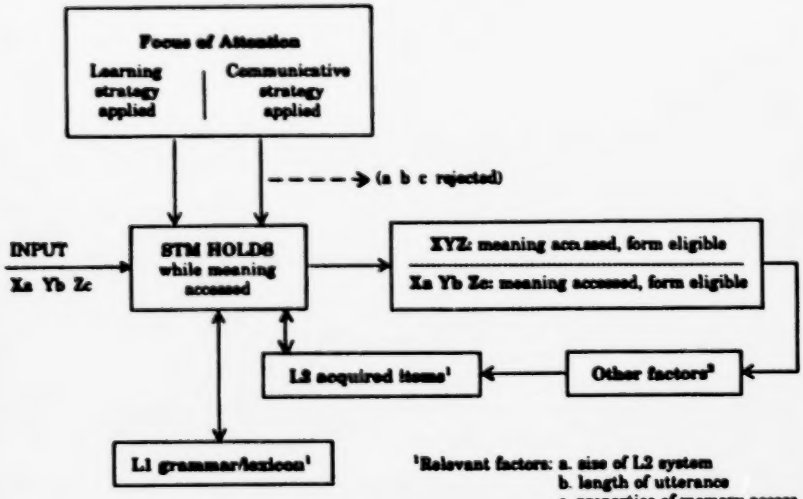
In the previous section, it was stated that learner comprehension of the L2

could be explained in terms of the information processing concepts of attention, effort, controlled and automatic processes. As the learner builds up an acquired system, a significant gain in terms of processing time may be made, thus releasing attention and effort to other aspects of the speech delivered. The learner may now focus on and process those pieces of communicatively unimportant information, e.g., third-person -S. With enough time and exposure to the language the information processing system will do with these forms what it did with previously communicative important forms: make them eligible for intake so that the learner can acquire them. When the learner is able to process both for meaning and for structure that is irrelevant to meaning, we will term this as operating under a "learning" "strategy." It may be the learning strategy that eventually allows the learner to process and ultimately acquire structure and morphology that was previously missing from the built-up L2 system.

It is important to note that the learning strategy can only be applied when meaning of an incoming L2 utterance can be decoded automatically, i.e., the decoding is not a controlled process. Only when the communicatively important aspects of an utterance can be instantaneously accessed is sufficient attention and effort released for the learner to process other elements. If the learner is struggling with meaning, or the vocabulary and syntax of an utterance overshoot the level of competence, then available attention and effort are used for the communicative strategy and the learning strategy is not evoked.

Following this line, it is *possible* that the learner applies the communicative strategy to part of the input sentence and if that strategy is automatic, the information processing system may have sufficient attention and effort to apply the learning strategy to another part of the utterance. There is no reason to suppose that the two strategies are mutually exclusive.

**FIGURE 1**



The interaction of these two processing strategies can be diagrammed as in Figure 1. Under input, the upper case letters again signify forms with more communicative information (the pieces necessary to understand the sentence as a whole). The lower case letters signify communicatively less or non-important forms. As the two strategies are applied, the less important items may be rejected during processing. This is depicted by the parentheses around the lower case letters. If the access of meaning is an automatic process for the particular utterance at hand, attention and effort are available to apply the learning strategy. Once the learning strategy is engaged, previously ignored elements of an utterance can be processed and may become eligible for intake. The meaning accessed box depicts several possible outcomes of the engagement of these strategies. In practical terms, the learning strategy could result in any permutation of upper and lower case letters: Xa Y Z; Xa Yb Z; X Y Zc, etc. Figure 1 offers only two possible outcomes as a matter of simplification.

The arrows leading to and from the L1 and L2 acquired systems are purposefully of different lengths. The short lines leading from short-term-memory to the L2 indicate the following: that automatic access of the L2 requires less time than reliance upon the L1. Conversely, the long lines from short-term-memory to the L1 indicate the following: that more time is needed to comprehend input if the learner is mentally translating.

## Affective Variables and Information Processing

If it is accepted that learners' information processing systems operate on input in the way suggested here, then the question arises as to how learners progress or do not progress in the language. Zoila (Schapira 1978) was characterized as a non-learner by Schapira: much like Schumann's (1978) Alberto, Zoila pidginized at a certain level of English competence. After acquiring a certain amount of the L2, Zoila just seemed to stop acquiring. If her information processing system utilized the learning strategy as well as the communication strategy, then why didn't Zoila keep on acquiring?

It has been suggested by many researchers that rate of acquisition and eventual level of attainment are best governed by affective variables. For Gardner (1973) integrative motivation was seen as an important factor in ensuring successful language development. For Schumann (1978) social and psychological distance are key factors in language acquisition. Such studies have in common at least the following: that internal psychological make-up of the learner is a crucial factor in accounting for successful language acquisition. Dulay, Burt and Krashen (1982) summarize the literature in this area and discuss the importance of the affective filter in L2 acquisition. If the filter is high, input does not become intake (acquisition does not occur or is inhibited). If the filter is low, then input can become intake and acquisition can happen. How does this relate to the information processing system?

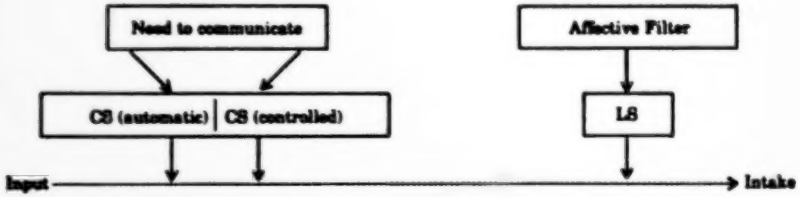
If the learning strategy is what allows for eventual development of the acquired system, and if affective variables are important for successful SLA, then it would seem that the learning strategy is governed by affective variables. Supposing that the learner had a low affective filter and was highly motivated to acquire the L2, then the information processing system would make more use of the learning strategy than would the system in a learner where the affective filter

was high. In other words, if the affective filter is high, then the learner rarely gets out of the communicative processiang strategy.

At first this seems like a paradox, for if there is appropriate built-up competence, then the communicative strategy may proceed as an automatic process and the learning strategy can be engaged. But, the fact that meaning can be accessed automatically without controlled processes does not a priori mean that the learning strategy will be applied by the information processing system. *The learning strategy will only be applied if the affective variables allow for it in the information processing system.* A learner's make-up will not dictate when the communicative strategy will be applied, for that is dictated by the need to communicate itself in or out of the classroom. If the learner is involved in meaningful interchange, where message is important, the communicative strategy is envoked. The same cannot be said for the learning strategy: it can only be applied under affectively favorable situations.

What is being suggested then, is an information processing system with two general strategies, one of which is triggered by need, the other of which is controlled by affective variables. (See Figure 2).

**FIGURE 2**




CS = communicative strategy
LS = learning strategy

## Information Processing Strategies and L2 Development

The strategies outlined here for the information processing system help us to account for some of what has been reported in L2 research. First, it has been claimed that child L1 morpheme orders are different from L2 orders. Second, for L2 learners, it has been suggested several times that the last morphemes/grammatical structures to be acquired are those that have little if any semantic (communicative) value. (See Hatch 1974, Warshawsky 1975, VanPatten 1984). On the other hand, it has also been suggested that frequency of occurrence in input plays the most important role in determining when a given form emerges in learner speech (Larsen-Freeman 1976, Andersen 1978, Plann 1979). This latter argument contradicts what has been reported by Brown (1973) for child L1 acquisition. However, as VanPatten (1984) suggested, when the acquisition of a structure is compared only to those of the same syntactic class (e.g.,

noun-oriented structures vs. verb-oriented structures), the child-adult differences in morpheme acquisition so often reported do not exist or at least are minimal. That is, child L1 and child/adult L2 learners tend to acquire noun-oriented morphemes in the same order and verb-oriented morphemes in another. If this is so, then the crucial question is why do *all* learners of English acquire morphemes in relatively the same order? Is the order due principally to the effects of frequency or to communicative value? Or is the order due to a combination of both factors?

If the human information processing system operates during language development (not during adult-like, native language use) as outlined in this paper, then communicative value becomes of primary importance. As long as the input processing strategy is searching for meaning first, which it must if the point of the interchange between learner and another locutor is information exchange, then those elements which are of greater communicative value will be attended to first and be processed. Those elements of little value will be ignored until there is sufficient attention and effort (as well as disposition) to allow for the processing system to work on them.

However, the foregoing statement is insufficient to account for all of L2 development. If several morphemes are equally important to the transmission of a message, why is there still an order of appearance in L2 speech? Why don't these structures appear simultaneously? It is here that frequency of occurrence in input may play an important role. Given two items of equal communicative value, information processing would "predict" that the item with a higher frequency of occurrence would be acquired first. As McLaughlin et al. state, automatic processes (as opposed to controlled) are built up through "...consistent and constant mapping of the same input to the same pattern of activation over many trials..." (1983:139). If acquisition is seen as the building up of automatic processes (those that require no attention or effort and do not interfere with controlled processes) that utilize the L2 system in the learner, then frequency of occurrence in input becomes important in establishing those processes.

In sum, it is suggested that there is an interaction between communicative value and frequency of input whereby once communicatively important forms are separated from communicatively non-important forms, then frequency of input guides the acquisition process in determining which forms will emerge before others. To be even more succinct, communicative value is primary; frequency of occurrence is secondary.

## Conclusions

The intent of this paper was to extend current discussions about human information processing to the realm of input processing during SLA. To that end, it was argued that learners could process input solely for meaning. It was also argued that once meaning could be accessed automatically, then attention could be directed to certain "non-important" structures in the input. However, it was suggested that affective variables may contribute to whether or not these structures are indeed processed and that L2 learners may pidginize if attention is not directed toward items of lesser communicative value. It was also suggested that the processes involved in the reception and decoding of input help to explain the emergence of form in learner speech.

Several words of caution are necessary in the conclusions of this paper. First, the role of automatic and controlled processes in input processing needs to be investigated empirically. The communicative and learning strategies outlined in this paper are hypotheses based on data and reports previously published in the field. While the two strategies do help to account for certain phenomena already documented, predictions about L2 input processing based on the two strategies need to be made and then tested for experimentally. Such experimentation might involve searching for automatic and controlled processes during learner input processing. Experimentation might also involve testing learner comprehension when communicatively unimportant morphology and structure are deleted from recorded speech to see if input processing is affected. Second, it remains to be seen whether or not the learning strategy is only a controlled process or an interaction of controlled and automatic processes. Controlled processes are said to require attention and effort (consciously), but Krashen (1981) claims that conscious attention to grammar results only in a Monitor and not in a subconscious acquired system. Many of my advanced students of Spanish (teaching assistants) report that they often pay attention to *how* someone else is talking to them in Spanish. These students claim that they notice adjective agreement, certain tense usage, and other structures in other persons' speech. Are these students verbalizing in some way the learning strategy suggested in this paper? Since meaning of incoming speech is probably processed automatically by their information processing systems, are they now able to direct attention to other elements of the utterances directed at them? Is this what will now help them to acquire those forms? The Monitor Model says that conscious attention does not result in acquisition. Perhaps a distinction should be made between conscious grammatical practice/conscious learning and the ability of the information processing system to pick up on how a message is encoded. It seems reasonable, based on the hypotheses presented here, that a learner could be involved in meaningful exchange (focus on message) but at the same time be tuned in to certain aspects of structure in the input. Thus, a learner may become consciously aware of a structure in input, but not practice it overtly and not really "know" a rule for its usage. If this is the case, then the definition of Krashen's "acquisition" may need to be expanded to accomodate research involving information processing.

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